Drinking Water Quality Management in Cracow, Poland:
A Case Study*

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Abstract

The aim of this paper is to develop a model for evaluating the parameters that determine the quality of potable water based on the example of the water supply network in the city of Cracow. The paper contains an evaluation of the impact of the individual factors on the quality of water in the distribution network. The input data were the results of an investigation concerning quality parameters of water collected from the municipal network in the city's supply zones operated by four water treatment plants, conducted over a seven-year research period. Samples were collected at 39 points located across the entire supply area. The paper presents an application of principal component analysis (PCA) method of factor analysis and hierarchical cluster analysis for identifying the most essential quality features of potable water. The factor analysis made it possible to determine the four principal components accounting for 69% of correlations between the values of the quality indicators of municipal water that were subjected to the investigation. The largest share was found for Factor 1, which accounted for 31% of the chemical composition of the water, correlated with calcium content, conductivity, nitrate(V) and magnesium content, and moderately with total THMs. Finally, a mathematical model was developed in which concentrations of total organic carbon, iron, aluminium, total trihalomenthanes, nitrates(V) and ammonium ion as well as turbidity and colour allow to account for approx. 72% of the variation in quality evaluation of municipal water.

Keywords: factor analysis, secondary water pollution, water supply network, water quality

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